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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,695	04/09/2004	Kaoru Masuda	KOBE.0061	8731

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REED SMITH HAZEL & THOMAS
Suite 1400
3110 Fairview Park Drive
Falls Church, VA 22042

EXAMINER	
DELCOTTO, GREGORY R	

ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 02/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,695	MASUDA ET AL.	
	Examiner	Art Unit	
	Gregory R. Del Cotto	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2004 and 14 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16 and 18-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/240,848.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4-04, 12-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-14, 16, and 18-22 are pending. Note that, the preliminary amendments filed 4/9/04 and 9/14/04 have been entered.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10/240,848 filed on 10/4/02.

Claim Objections

Claims 7, 8, 13, 14, and 18-22 are objected to because of the following informalities:

With respect to claims 7, 8, 13, 14, and 18-20, it is suggested that Applicant amend these claims to be in proper Markush format by inserting the clause "selected from the group consisting of" before the Markush group.

With respect to claims 19 and 20, it is suggested that Applicant delete "N-methyl-2-pyrrodine" and insert "N-methyl-2-pyrrolidone"

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially" in claim 10 is a relative term which renders the claim indefinite. The term "substantially free" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 5-8, 11, 13, 14, 16, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,306,564).

Mullee teaches a commercially available solvent, such as a stripping chemical and/or an organic solvent, is supported by supercritical CO2 to remove a resist, its residue, and/or an organic contaminant off the surface of a semiconductor wafer. See Abstract. Preffered types of chemicals include N-methyl pyrrolidone, diglycol amine, hydroxyl amine, catechol, ammonium fluoride, ammonium bifluoride, etc. Other chemicals such as an organic solvent may be used independently or added to one or more of the chemicals to remove organic contaminants from the wafer surface. These solvents include an alcohol, dimethyl sulfoxide, methanol, ethanol, etc. See column 4, lines 10-30.

Mullee does not teach, with sufficient specificity, a cleaning composition containing carbon dioxide, a fluoride compound, a cosolvent, and the other requisite components in the specific proportions as recited by the instant claims.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to formulate a cleaning composition containing carbon dioxide, a fluoride compound, a cosolvent, and the other requisite components in the specific proportions as recited by the instant claims, with a reasonable expectation of success and similar results with respect to other disclosed components, because the broad teachings of Mullee suggest a cleaning composition containing carbon dioxide, a fluoride compound, a cosolvent, and the other requisite components in the specific proportions as recited by the instant claims.

Claims 1-3, 5-11, 13, 16, and 18-20 are rejected under 35 U.S.C. 102(a) as being anticipated by WO 01/33613.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

'613 teaches a method of removing photoresist and residue from a substrate by maintaining supercritical carbon dioxide, an amine, and a solvent in contact with the substrate so that the amine and the solvent at least partially dissolve the photoresist and the residue. See Abstract. Preferable amines include (2-(methylamino)ethanol, PMDETA, triethanolamine, etc. Preferably, the solvent is selected from DMSO, ethylene carbonate, N-methylpyrrolidone, BLO, acetic acid, etc. See page 5, lines 5-30. One embodiment of the invention includes a composition containing an aqueous fluoride such as ammonium fluoride, an amine, and solvent for cleaning photoresists. See page 10, lines 25-35. '613 discloses the claimed invention with sufficient specificity to constitute anticipation.

Accordingly, the teachings of '613 anticipate the material limitations of the instant claims.

Claims 1, 3, 5, 10, 11, 13, 14, 16, and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al (US 2003/0125225).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Xu et al teach chemical formulations and methods for removing unwanted material, such as unexposed photoresist, metal oxides, CMP residue, and the like, from

semiconductor wafers or other substrates. The formulations utilize a supercritical fluid-based cleaning composition, which may further include co-solvent(s), surfactant(s), chelating agent(s), and/or chemical reactant(s). See Abstract. Suitable supercritical fluids include carbon dioxide, oxygen, argon, water, ammonia, etc. Suitable co-solvents include methanol, ethanol, N-methylpyrrolidone, monoethanolamine, alkyl ammonium fluoride, butylene carbonate, etc. See para. 10-12. One preferred embodiment relates to a cleaning composition comprising supercritical carbon dioxide, isopropanol, and ammonium fluoride. See para. 29. Another embodiment includes a composition containing a supercritical fluid, cosolvent, active agent, surfactant, and chelating agent. See para. 38. Suitable active agents include ammonium fluoride, alkyl sulfonic acids, alkyl amines, etc. See para. 43. Surfactants useful may be of any type and include anionic, nonionic, cationic, and zwitterionic types. See para. 46.

Specifically, Xu et al teach a cleaning composition containing supercritical CO2, isopropanol, and ammonium fluoride. See paras. 89-91. Xu et al disclose the claimed invention with sufficient specificity to constitute anticipation.

Accordingly, the teachings of Xu et al anticipate the material limitations of the instant claims.

Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,306,564) as applied to claims 1-3, 5-8, 11, 13, 14, 16, and 18-20 above, or WO 01/33613 as applied to claims 1-3, 5-11, 13, 16, and 18-20 above, and further in view of Vaartstra (US 6,242,165).

Mullee and '613 are relied upon as set forth above. However, neither reference teaches the use of an alkyl ammonium fluoride in addition to the other requisite components of the composition as recited by the instant claims.

Vaartstra teaches a method for removing organic material in the fabrication of structures including providing a substrate assembly having an exposed organic material and removing at least a portion of the exposed organic material using a composition having at least one component in a supercritical state. See Abstract. Additionally, other components may be added to the compositions to enhance the organic material removal process. Buffering agents such as ammonium fluoride, tetramethyl ammonium fluoride, surfactants, etc., may be added to the compositions. See column 6, lines 10-25.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use tetramethyl ammonium fluoride in the cleaning composition taught by Mullee or '613, with a reasonable expectation of success, because Vaartstra teaches the equivalence of tetramethyl ammonium fluoride to ammonium fluoride in a similar cleaning composition and further, Mullee teaches the use of ammonium fluoride.

Claims 2, 4, 6-9, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 2003/0125225).

Xu et al are relied upon as set forth above. However, Xu et al do not teach, with sufficient specificity, a cleaning composition containing the specific solvent and basic compound in addition to the other requisite components of the composition as recited by the instant claims.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to formulate a cleaning composition containing the specific solvent and basic compound in addition to the other requisite components of the composition as recited by the instant claims, with a reasonable expectation of success, because the broad teaching of Xu et al suggest a cleaning composition containing the specific solvent and basic compound in addition to the other requisite components of the composition as recited by the instant claims.

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,306,564), WO 01/33613, or Xu et al (US 2003/0125225) as applied to the rejected claims above, and further in view of McCullough et al (US 5,976,264).

Mullee, '613, or Xu et al are relied upon as set forth above. However, none of the references teach the use of methane or a fluorosurfactant in addition to the other requisite components of the composition as recited by instant claims 21 and 22.

McCullough et al teach a method for the removal of fluorine or chlorine residue from an etched precision surface such as a semiconductor sample which comprises exposing said precision surface to liquid CO_2 under appropriate conditions that are sufficient to remove the residue from the precision surface. See Abstract. The preferred supercritical fluid is carbon dioxide which may be used alone or in admixture with another additive such as H_2O, Ar, NH_3, methane, etc. Surfactants which aid in removing the reactive ion etching residue from the semiconductor sample containing at least one CF_x functional group may also be used in conjunction with a supercritical fluid. See column 5, lines 5-30.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use methane in the cleaning composition taught by Mullee, '613, or Xu et al, with a reasonable expectation of success, because McCullough et al teach the equivalence of methane to carbon dioxide as a supercritical fluid in a similar cleaning composition and further, Xu et al teaches the use of carbon dioxide as a supercritical fluid.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use a surfactant containing at least one CF_x functional group in the composition taught by Mullee, '613, or Xu et al, with a reasonable expectation of success, because McCullough et al teach the use of a surfactant containing at least one CF_x functional group aid in semiconductor residue removal in a similar composition which would be desirable in the compositions taught by Mullee, '613, or Xu et al.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,306,564) as applied to claims 1-3, 5-8, 11, 13, 14, 16, and 18-20 above, and further in view of McCullough et al (US 5,976,264) or WO01/33613.

Mullee is relied upon as set forth above. However, Mullee does not teach the use of water in addition to the other requisite components of the composition as recited by the instant claims.

McCullough et al or '613 are relied upon as set forth above.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use water in the cleaning composition taught by Mullee, with a reasonable expectation of success, because McCullough et al teach the equivalence of

H_2O to carbon dioxide as a supercritical fluid in a similar cleaning composition and, further, Mullee teaches the use of supercritical CO_2.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use water in the cleaning composition taught by Mullee, with a reasonable expectation of success, because '613 teaches the use of aqueous solutions of ammonium fluoride in a similar cleaning composition and, further, Mullee teaches the use of ammonium fluoride in general which usually is formulated as an aqueous solution.

Conclusion

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Remaining references cited but not relied upon are considered to be cumulative to or less pertinent than those relied upon or discussed above.

Applicant is reminded that any evidence to be presented in accordance with 37 CFR 1.131 or 1.132 should be submitted before final rejection in order to be considered timely.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory R. Del Cotto whose telephone number is (571) 272-1312. The examiner can normally be reached on Mon. thru Fri. from 8:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on (571) 272-1316. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregory R. Del Cotto
Primary Examiner
Art Unit 1751

GRD
February 11, 2005